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ABSTRACT

The focus of this guide is directed upon arithmetic experiences and skills needed for every day business, however it is also designed to develop skill in basic mathematical functions, and to deal with the specific mathematical concepts applicable to personal use and to fields of employment. Fourteen units are included: General Review of Basic Mathematical Concepts, Wage Income, Commission Income, Consumer Spending, Consumer Credit, Savings and Investments, Taxes, Home Ownership, Transportation and Travel, Operation of a Small Business, Operational Decisions of the Retailer, Measurements Frequently Used by the Consumer, Computer Mathematics, and the Metric System. In each unit, specific objectives, related content, and suggested student activities are presented in a three-column format. Each unit also includes overall objectives and a suggested vocabulary. Appendixes contain brief information on job families (or clusters), hints for metric instruction, two sample student activities about the metric system, and a bibliography of related materials. (SH)

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CE 012 159

PUBLIC SCHOOLS OF THE DISTRICT OF COLUMBIA

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BUSINESS AND CONSUMER ARITHMETIC

Curriculum Guide

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1977

A C K N O W L E D G M E N T S

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INTRODUCTION

This course is designed to develop skill in basic mathematical functions and to deal with the specific mathematical concepts applicable to personal use and to fields of employment. Components of instruction include training of clerical, stenographic, office practice, and bookkeeping students.

A prerequisite for success in this course includes mastery of mathematical fundamentals and a knowledge of systematic problem-solving.

Focus is directed upon arithmetic experiences and skills needed for everyday business. Units in this guide are presented as suggested points of departure for instruction and provide activities to reinforce fundamental skills. Attention has been given to the development of a common cycle of instructional activities based on sound principles of arithmetic teaching.

In support of the Metric Conversion Act of 1975 (Public Law 94-168), a resource unit has been added for teaching metrics. The content can be adapted for use with varying abilities, ages and teaching-learning situations. The "hands-on" approach is recognized as the best method for learning and thinking metrics. A brief overview of the metric system is included in the Appendix. Instructors who are fairly familiar with the metric system will find this information helpful for refreshing their knowledge. Instructors who have had less experience with the metric system should find this to be a helpful overview of and possible extension of their knowledge. Many ideas for suggested learning activities in metrication were extracted from materials developed and nationally field tested by the Ohio State University, pursuant to Contract No. OEC-0-74-9335 with the Bureau of Occupational and Adult Education, U. S. Department of Health, Education and Welfare.

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UNIT I

GENERAL REVIEW OF BASIC MATHEMATICAL CONCEPTS

General Objective: *The student will be able to:*

Discern the areas in need of review before proceeding with suggested course content.

VOCABULARY

Addend	Identity
Associative	Minuend
Closure	Principle
Commutative	Product
Difference	Quotient
Dividend	Remainder
Divisor	Subtrahend
Factor	Sum

UNIT I - Review of Basic Mathematical Concepts

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Take diagnostic test to determine area in need of review.
	I. Fundamental operations	
Calculate and estimate answers mentally.	A. Whole numbers	Drill students in addition of whole numbers and horizontal addition of var ous types of fractions. Use the associative and commutative properties.
	B. Fractions	Assign drills in subtraction of whole numbers and all types of fractions.
		Prepare a vertical and horizontal chart with numbers 1 to 15. In each square fill in the product of the numbers in both the horizontal and vertical rows.
		Review multiplication using problems with 1, 2 and 3 digit multipliers.
Solve oral and written problems using the fundamental operations.		Observe demonstration and perform individual exercises in division to develop accuracy and speed in drills.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Compute problems involving percent relationship making sure answers are accurate.	II. Percent	Prepare appropriate drills to find: - What percent one number is of another. - A number when a certain percent of it is known. - The percent of increase or decrease. Construct mathematical games integrating fundamental operations for reinforcement (e.g., puzzles, magic squares and placing right numbers in problems to make solution correct). Re-test at the end of the review of basic mathematical concepts to determine overall progress before going into consumer problems.

UNIT II

WAGE INCOME

General Objective: *The student will be able to:*

Compute weekly regular time, overtime and total earnings accurately.

VOCABULARY

Deduct	F.I.C.A.
Double time	Overtime
Earnings	Payroll
Employee	Regular
Employer	Salary
Exempt	Timecard

Wages

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	I. Earnings	
Calculate weekly regular time, overtime and total earnings.	A. Regular time	Discuss pay schedule (e.g., hourly, daily, weekly wages). Explain the difference between regular time or straight time and overtime. Demonstrate computations for finding total regular wages. Practice required procedures to find regular salary of employees.
	B. Overtime	Prepare a problem to demonstrate computing overtime wage. Emphasize overtime rate is to be computed one and a half the given regular hourly rate. Discuss double time and compensatory time.
Figure wages accurately based on piece-rate.	C. Piece-rate	Explain the procedures of piece-rate wages. Give exercises to compute piece-rate wages.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Read correctly hours worked from timecard and compute accurately the weekly wages.	II. Timecard	Obtain timecards from local business firms. Practice reading correcily the number of hours worked. Allow each student to prepare a timecard and keep daily record of time entering and leaving classroom. At the end of specified time based on a given rate the student will compute wages.
Discuss the kinds of deductions withheld from wages. Read and use income tax withholding table proficiently in performing computations. Compute FICA tax accurately.	III. Deductions	Discuss the kinds of deductions employers can withhold (e.g., health benefits, union dues). Based on given exemptions and wages, use withholding tax table to determine tax deductions. Secure and read materials from the Social Security Administration on retirement benefits. Provide a variety of examples to allow student to compute amount deducted from wages for social security. Compute take-home pay based upon a variety of deductions.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Prepare a payroll register without errors in computations.	IV. Payroll register	Prepare payroll register on form provided by teacher.

UNIT III

COMMISSION INCOME

General Objective: *The student will be able to:*

Compute accurately salesmen's and agents' commissions.

VOCABULARY

Agent	Legal
Collect	Net proceeds
Commission	Principal
Excess	Receive
Expense	Service
Graduate	Straight

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	I. Types	
Compute correctly straight commission.	A. Straight	Discuss computation of straight commission. Give each student a specified number of school newspapers to sell. State rate of commission. Ask students to give commission earned from total sales. Compute commission when the rate is stated as a percent. Divide class into groups selling weekly periodicals and daily newspapers. Given a specific period of time to sell items each will state total commission. Vary quantity plus rate. Assign exercises for homework.
Compute with accuracy and speed income based on salary plus commission.	B. Salary plus commission	Explain salary in addition to commission method of computing earnings. Compute sample exercises.

INSTRUCTIONAL OBJECTIVES The student will be able to:	CONTENT	SUGGESTED LEARNING ACTIVITIES
		Discuss the quota-bonus plan as a commission earned from sales in excess of fixed amount. Assign a group of three volunteers to survey at least three stores in the community to find the method used to pay salespersons. Class discussion on earnings: straight commission vs. salary plus commission. Give exercises for class work.
Solve accurately problems based on the graduated commission plan.	C. Graduated	Define and discuss the graduated commission. Demonstrate with a sample problem. Assign students problems to compute on chalkboard, and explain procedure of computation to class. Invite comments on twofold purpose of the graduated plan. Assign exercises for homework.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Calculate the commission, commission rate and/or sales when one of the factors is missing.	II. Commission, commission rate and sales	Explain in triangular form the percentage, rate and base. Substitute commission, rate of commission, and sales. Give three samples to compute rotating one of the missing three parts in each. Assign similar problems as class works to develop proficiency.
Figure correctly agent's commission and net proceeds.	III. Agent's commission	Write on chalkboard the two types of agents to discuss (e.g., real estate agent and collection agent). Discuss commissions as paid to the real estate agent and the collection agent. Demonstrate with sample problems using formulas to determine agent's commission and the net proceeds. Find the agent's commission based on sale of property. SALE PRICE MINUS COMMISSION MINUS EXPENSES = NET PROCEEDS SALE PRICE - COMMISSION - EXPENSES =NET PROCEEDS

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		Find the agent's commission based upon amount collected from overdue bills. AMOUNT COLLECTED MINUS COMMISSION EQUALS NET PROCEEDS AMOUNT COLLECTED - COMMISSION = NET PROCEEDS Reinforce learning concepts by assigning related problems for classwork and homework.

UNIT IV

CONSUMER SPENDING

General Objective: *The student will be able to:*

Compute accurately and rapidly cost of purchases commonly connected with daily buying activities of the consumer.

VOCABULARY

Aliquot	Hundred (C)
Base	Hundredweight (cwt)
Equivalent	Quantity
Denominator	Relationship
Factor	Thousand (M)
Fraction	Ton (T)

Unit price

INSTRUCTIONAL OBJECTIVES The student will be able to:	CONTENT	SUGGESTED LEARNING ACTIVITIES
	I. Buying	
	A. Aliquot	Define "aliquot." Discuss aliquot parts of such denominators (base) as $1, 100, 1000. Prepare table of common aliquot parts. Give decimal and fraction of each. Solve assigned problems.
Compute problems correctly based on unit prices.	B. Unit prices	Discuss unit price. Give exercises to find extension of unit price. Have students bring in food shopping section of newspaper. Give problems based upon items and unit prices advertised. Have a "shopping spree" in the classroom. Students will cut out of newspaper and magazines articles bought regularly in household. Paste picture of each item along with unit price on a separate sheet of construction paper. Display posters in room.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Each student will shop for needed items and compute total grocery bill, indicating quantity of each item, unit price and total amount.
Figure accurately the reduced price of items on sale.	II. Sales	Drill on changing percents to decimals. Discuss the difference between marker price (list price) and sale price. Observe demonstration of a sample problem in which the sale price is to be determined. Use newspapers to display various types of sales. Have students compute problems assigned from display. Assign exercises for homework.

UNIT V

CONSUMER CREDIT

General Objectives: *The student will be able to:*

State the major types of consumer credit.

Use competently the different methods of figuring interest on loans.

Compute finance charges on items bought on the installment plan.

VOCABULARY

Annual	Maturity
Collateral	Non-interest
Demand note	Payee
Discount	Principal
Finance charge	Promissory note
Installment	Quarterly
Interest	Rate
Interest-bearing	Semi-annual
Maker	Time

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	I. Borrowing from a bank	Discuss some reasons for borrowing money.
Fill out a promissory note.	A. Promissory note	Define "promissory note." Distribute blank promissory notes, and identify and explain parts of a note. Prepare promissory note on form distributed by teacher.
Compute the interest accurately on loan due at maturity in years, months and/or days.	B. Single payment loans 1. Interest bearing	Observe demonstration of the procedure used to find interest on loan due at maturity in years and/or months. Solve assigned problems. Following textbook illustration give steps to follow for determining interest due at maturity when time is expressed in days. Differentiate between methods used for banker's interest and exact or accurate interest.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Find the maturity date in years, months and/or days.		Practice finding the due date of loans when the time is expressed in years, months and/or days.
Compute problems correctly using simple-interest table.		Use a simple-interest table to compute assigned problems.
		Solve problems using the 60 day 6% method of calculating interest.
Calculate problems to find the proceeds of a discounted note.	2. Non-interest bearing	Differentiate between an interest bearing note and a non-interest bearing note.
		Observe procedure used to find proceeds of a discounted note. Solve related problems.
State four common types of collateral.	II. Borrowing on collateral	Identify some common forms of collateral.
Prepare without errors a demand note.		Examine parts of a demand note from illustration in textbook. Prepare a demand note on forms distributed by teacher, using illustration in textbook as guide.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Compute problems to find the amount due on date of settlement.		Observe procedure for finding the amount due on date of settlement of a demand note. Give correct solutions to assigned problems.
Calculate accurately monthly payment on installment loan.	III. Installment loans	Discuss installment payment loans.
	A. Bank	Observe illustration of sample problems to find the monthly payment given the face value of note, interest rate and item. Compute problems in classroom for reinforcement of learning. Prepare homework assignment.
Compute accurately monthly payment on loan and prepare schedule of payments.	B. Credit union or finance company	Observe the procedure used to find the monthly payments of interest and principal on a loan. Have students plan answers on schedule forms distributed. Given the amount of loan, the number of payments, payment on principal and finance charge on unpaid balance, prepare a schedule of monthly payments.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Compute problems and place answers on schedule form distributed.
		Solve similar problems for homework.
State types of items usually bought on installment.	IV. Installment buying	Give reasons and list items usually bought on installment. Distinguish between installment charge and regular charge accounts.
		Observe the procedures used to compute the cost of buying an item on the installment plan.
Solve problems to find the cost of items bought on installment.		Given the cash price of the item and installment terms, find the installment cost.
		Observe the steps to follow in finding the annual percentage rate for installment buying.
		Distribute copies of annual percentage rate table. Solve assigned problems using the annual percentage rate table.

UNIT VI

SAVINGS AND INVESTMENTS

General Objectives: *The student will be able to:*

State several ways consumers can save part of their earnings for future contingencies.

Compute interest on investments.

VOCABULARY

Beneficiary	Interest
Dividend	Investment
Insured	Policy
Insurer	Premium

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	I. Bank savings accounts	
Identify and explain the types of savings accounts.	A. Types of savings accounts	Discuss types of savings accounts. Give some reasons for saving.
Compute interest on savings accounts.	B. Application of interest	Examine copy of a savings passbook. Analyze and determine how interest on passbook was computed. Observe steps used to compute compound interest quarterly on savings using banker's days. Role-enact in pairs bank teller and depositor. Teller computes interest and current balance on depositor's passbook; alternate roles.
	II. Investments	
State the advantages and disadvantages of the five types of life insurance.	A. Life insurance	Discuss the types of life insurance and explain the advantages and disadvantages of each.
	1. Whole life insurance	
	2. Endowment life insurance	

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Compute the premium for the five types of life insurance.	3. Term insurance 4. Group life insurance 5. Industrial insurance	Use a table of annual life insurance rates to compare costs of the five types of insurance as they apply to the same age. Prepare exercises for classwork and homework.
Describe the procedure used to determine cash surrender value of policy.		Examine a cash surrender value chart and discuss headings. Practice reading chart to determine cash surrender value of policy.
	B. Savings bonds	Discuss the types of savings bonds.
		Use a redemption table to compute interest gained on bond each year.
	C. Stocks	Discuss corporation stocks.
Compute the cost of buying a share of stock.		Observe operations required to find the total cost of stock. Practice assigned exercises.
Calculate the interest gained on investment.		Observe demonstration of determining income gained from stock. Use newspaper for additional examples. Solve assigned problems.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	D. Real estate	
Use annual net income formula to determine profit from investment.		Observe procedures for finding the annual net income from an investment. Use the formula: ANNUAL RENTAL INCOME MINUS ANNUAL EXPENSE EQUALS ANNUAL NET INCOME. ARI - AE = ANI Solve assigned problems.

UNIT VII

TAXES

General Objectives: *The student will be able to:*

State and explain the need for taxation.

Compute sales, social security, income and real estate taxes.

VOCABULARY

Assessed value	Retirement
Community	Survivor
Disability	Tax budget
Exemption	Tax rate
Personal property	Valuation
Real property	Withholding tax

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	I. Retail goods	
	A. Sales tax	Discuss some benefits citizens derive from tax revenue.
Compute the sales and excise taxes on purchases given the cost of the item.	B. Excise tax	Prepare sales slip for customers on forms distributed by teacher. Use sales tax schedule also distributed to secure sales tax on total purchases.
		Distinguish between sales and excise taxes.
		Request students to bring in telephone bills. Identify excise tax on bill.
		Solve assigned problems involving sales and excise taxes.
	II. Social security	Discuss the various categories of benefits provided by social security.
Determine the social security tax deducted from wages.		Observe computation on earnings based on current tax rate.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Determine tax deduction from earnings on withholding tax table. Compute problems using tax table.	III. Personal income tax	Give amount deducted from wages based upon exemptions from a withholding tax table. Solve assigned problems using table.
Figure the valuation and amount of tax on property.	IV. Real estate tax	Discuss the difference between real property and personal property. Assign three students to find out the tax rates in the District of Columbia, Prince Georges and Montgomery counties. Report findings to class, then compare rates. List benefits derived from property taxes. Observe computation to find assessed valuation and amount of tax on real property. Solve assigned problems.

UNIT VIII

HOME OWNERSHIP

General Objectives: *The student will be able to:*

Determine the costs involved in owning a home.

Solve problems that relate to home ownership.

Check the accuracy of utility bills.

VOCABULARY

Amortize	Insurer
Assessed valuation	Kilowatt hours
Coinsurance	Limited service
Cost-plus basis	Market value
Depreciation	Mill
Extended coverage	Mortgage
Face of policy	Policy
Insurable interest	Premium
Insured	Unlimited service

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	I. Owning a home	
	A. Buying a ready-built home	Discuss the expenses involved in owning a home--taxes, insurance, interest on the mortgage, depreciation, upkeep. Compare the cost of buying a home to the cost of renting. Research guidelines a family can use in determining how much to spend for housing. Interview a homeowner to discuss some of the expenses involved in buying a home.
Compute the cost of building a home.	B. Building a home	Discuss the problems and costs involved in having a home built. Compute the cost of building a home.
Determine the interest cost using an amortization table.	C. The amortization table	Discuss securing a mortgage for a home. Practice reading the amortization table.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Select a house from an advertisement. Use an amortization table and figure the cost of the interest on the mortgage.
Differentiate between the assessed value and the market value of a house.	II. Taxes on a home A. Assessed value	Discuss assessed valuation as a basis for taxes. Discuss the difference between assessed value and market value.
Find the amount of real estate taxes when the rate is expressed for $100 or $1,000 of assessed valuation and when it is expressed in mills.	B. Computation of taxes	Observe computation of taxes using $100 or $1,000 of assessed valuation as the tax basis. Solve assigned problems. Observe computation of real estate taxes when the rate is expressed in mills or cents per $1 of assessed valuation. Solve assigned problems.
Decide the type of home insurance that is best in a given situation.	III. Home insurance A. Types B. Premiums	Discuss the purposes of home insurance and factors that affect its cost. Discuss method of payment of home insurance premiums.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Determine the premium on home insurance under given circumstances.		Visit several insurance companies to find the rates for home insurance for different areas of the city. Discuss causes for differences.
	III. Home insurance (cont'd)	Discuss computations involving short-term policies and cancellations by the homeowner and by the company. Solve related problems.
		Discuss coinsurance and settlement under a coinsurance clause.
		Compute the liability of the insurance company for specific losses when the homeowner has a coinsurance clause in his/her policy.
Read utility meters.	IV. Utility bills	Discuss KWH and cubic feet as units of measure for electricity, gas and water consumption.
	A. Electric	
	B. Gas	Practice reading utility meters.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Check utility bills based on the rate schedule.	C. Water	Read the utility meters at home and check the accuracy of the consumption for the month. Obtain rate schedules from the utility companies and check the accuracy of bills that have been brought to class. Solve assigned problems.
Identify types of telephone services available within the D. C. metropolitan area. Determine the best type of telephone service in given situations.	D. Telephone bills	Discuss briefly the types of telephone services available. Indicate instances wherein each type of service might be desirable.
Determine monthly telephone cost.		Discuss the taxes that appear on the telephone bills. Examine sample or actual telephone bills identifying the cost of service, taxes, etc. Using related problems compute monthly cost of teiephone service.

UNIT IX

TRANSPORTATION AND TRAVEL

General Objectives: *The student will be able to:*

Find the cost of owning and operating an automobile.

Determine distance and travel time based on timetable data.

Compute parcel post, express, and freight charges.

VOCABULARY

Bodily injury
Collision insurance
Comprehensive
Depreciation
Express
Freight
Parcel post
Property damage
Trade-in value

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Specify the details involved in automobile ownership.	I. Automobile ownership	
	A. Purchasing	Debate cash purchase versus installment buying. Discuss finance charges. Solve assigned problems. Assign a group of three or more students to investigate various sources of automobile financing to find out which source had the lowest interest rate. Report to class.
Determine the annual depreciation on a car.	B. Depreciation	Define "depreciation." Observe procedure used to determine the average annual depreciation. Compute the average annual depreciation. Calculate the rate of depreciation.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	C. Automobile insurance	Review types of automobile insurance including in the review a discussion of why rates vary from one place to another.
Identify and describe the types of automobile insurance available in the metropolitan area.	1. Types	
Describe which type or types of automobile insurance are essential.		
Determine the ways automobile insurance premiums are calculated.	2. Premiums	Using tables that are available in the textbook or from other sources, compute the premium for the various types of coverage.
	3. Importance	Discuss the need for automobile insurance.
Estimate the monthly operating expense of an automobile.	D. Automobile operation	Discuss the actual monthly cost of operating a car.
	1. Gas	
	2. Upkeep	Observe the computation of the cost of license plates.
	3. Repairs	Determine the total cost of operating under given circumstances. Solve assigned problems.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Define "travel."	II. Public travel	
Determine the various modes of public travel.	A. Variations	Compare cost of travel by several modes of public transportation between two given points. Discuss public transportation as a means of travel and give the advantages of each method.
Make arrangements to travel from one given point to another.	B. Arrangements	For a class report each student selects a different destination. Have student check the various modes of travel investigating departure and arrival times as well as fares to the designated place. Considering time and expense the student decides the best method for reaching the destination.
	III. Public travel agencies	
Define "travel agency."	A. Definition	
	B. Role	Discuss the travel agency's role in arranging travel plans.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		List selected travel services within the District of Columbia and discuss differences in each (include bus, airlines, train and rental autos).
Determine the least expensive method of travel in a given situation.	C. Fares and scheduling	Practice reading timetables to determine the distance between two points, travel time and average speed.
Read a timetable and determine the distance between two points.		
Calculate savings when a round-trip ticket is purchased instead of two one-way tickets.		Discuss round-trip as opposed to one-way tickets.
Determine the best method to use in shipping articles.	IV. Goods transportation/ shipment.	Discuss the methods of transporting/shipping goods.
		Discuss the difference between parcel post, express, air express, and freight.
Compute the cost of shipping goods via parcel post, express, air express and freight.		Using the postal zone chart, determine the cost of shipping packages of varying weights to different zones by parcel post.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Compare the cost of shipping the same packages by express, air express and freight.

UNIT X

OPERATION OF A SMALL BUSINESS

General Objectives: *The student will be able to:*

Prepare a simple balance sheet.

Prepare a payroll chart.

Prepare a change sheet.

Read and interpret graphs and charts.

VOCABULARY

Assets
Balance sheet
Beginning inventory
Capital
Cost of goods sold
Ending inventory
Gross profit
Liabilities
Net income
Net profit
Net sales
Net worth
Proprietorship
Operating expenses
Returns and allowances
Sales

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Prepare a balance sheet when the assets, liabilities and proprietorship are given.	I. The balance sheet	Discuss the sections of the balance sheet ("Assets," "Liabilities," "Proprietorship").
		Using the designated format, prepare balance sheets based on the information given.
Determine the assets, liabilities and proprietorship when any two are given.		Observe the calculation of the assets, liabilities, or proprietorship when one of them is missing. Solve assigned problems.
Prepare an income statement when all of the essentials are provided.	II. The income statement	Obtain some financial statements from banks, other businesses or the newspapers.
		Discuss the parts of the income statement.
		Solve problems in which it is necessary to find net sales, gross profit, cost of goods sold, net income and/or net loss.
		Prepare an income statement.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Analyze the major items in the income statement and prepare a percentage analysis of them.		Using net sales as the base, prepare a percentage analysis of cost of goods sold, gross profit, operating expenses and net income.
Prepare a payroll chart from the individual employee's timecards.	III. Figuring payrolls	Review the timecard. Discuss the deductions that may appear on the payroll. Calculate the pay for various employees (hypothetical) and determine the total payroll.
Prepare change sheet that is used when paying employees in cash.		Discuss the use of the change sheet by the payroll clerk. Prepare change sheet utilizing the largest denominations possible for paying employees.
Read and interpret information present in graph and chart form.	IV. Charts	Discuss the types and uses of graphs--bar, line, circle and rectangle.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Using graphs in textbook or other sources interpret the information tnat is provided.
Prepare simple graphs.		Prepare simple graphs from specific information, for example, ages of students in the class; number of students from different areas of the city.

UNIT XI

OPERATIONAL DECISIONS OF THE RETAILER

General Objectives: *The student will be able to:*

Check correctness of incoming invoices.

Differentiate between a cash discount and a trade discount.

Determine gross and net profit from operations.

VOCABULARY

Cash discount
Cash over
Cash short
Code
Cost
Credit period
Discount
Free on board (f.o.b.)
Gross loss
Gross profit
Invoice
List price
Markdown
Marked price
Markup
Net price
Net profit
Net purchases
Purchases
Retail price
Selling price
Terms of sale
Trade discount

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Check an incoming invoice accurately.	I. Purchase invoice	Obtain a purchase invoice from a local business or duplicate one that may have come into the main office at the school. Discuss the items that appear on the invoice.
		Verify extensions on invoices and the totals.
Determine net purchases when there are purchase returns.		Discuss the effect of purchase returns on net purchases.
Compute the net purchases.		Study example demonstrating the computation of net purchases.
		Solve assigned problems.
Calculate the invoice price when a trade discount has been allowed.	II. Trade discounts	Discuss the reasons for trade discounts.
		Observe the procedure used to determine the invoice price.
		Given certain list prices and rates of trade discounts, calculate the amount of the trade discount and the list price.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Determine the rate of the trade discount.		Using the list price and the invoice price, determine the amount of the trade discount and the rate of the discount.
Define "cash discount."	III. Cash discounts	Discuss cash discounts.
		Discuss terms of sale.
		Observe solution to problems determining the total amount due when there is a cash discount.
		Solve assigned problems.
		Review due dates.
Determine the last date on which a discount is allowed.		From the information given in the terms of the invoice, determine the last date on which the discount is allowed.
Determine the amount saved when it is necessary to borrow in order to take advantage of a cash discount.		Discuss the positive side of borrowing money in order to take advantage of a cash discount.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Determine the rate of the discount.		Solve assigned problems using the formula CASH DISCOUNT MINUS COST OF INTEREST EQUALS AMOUNT SAVED. CASH DISCOUNT - COST OF INTEREST = AMOUNT SAVED Using the formula RATE EQUALS CASH DISCOUNT DIVIDED BY INVOICE PRICE $RATE = \frac{\text{CASH DISCOUNT}}{\text{INVOICE PRICE}}$ solve assigned problems.
Determine who pays for transporting foods--the shipper or the retailer.	IV. Buying expense	Discuss the cost of purchases (expense of merchandise plus the expense of delivery). Distinguish between "free on board (F.O.B) destination" and "free on board (F.O.B.) point of origin."
Compute the cost of merchandise to the retailer.		Calculate the cost of purchase when there are cash discounts and/or f.o.b. point of origin.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
State, orally or in writing, the function of the cash register.	V. Sales records	Discuss the cash register and some of its uses. Visit businesses with different types of cash registers and discuss the use of each.
Prove cash.		Observe the procedure for proving cash. Solve assigned problems.
Determine the amount of the discount.	VI. Retail discounts	Discount retail discounts, differentiating them from trade and cash discounts. Using problems in textbook, find the amount of the discount.
Find the selling price once he/she has found the discount.		Using previous experience with discounts, determine the selling price of various items. Calculate the selling price of various items that are advertised in the newspaper.
Differentiate between gross profit and net profit.	VII. Profit on sales	Discuss net profit and gross profit.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Find the new profit/loss.		Using the formula for finding the net profit or net loss, determine same for assigned problems.
Determine the most that the retailer can afford to pay for his/her merchandise and realize a specific profit.	VIII. Pricing goods A. Sales price basis	Observe the application of the formula--MARKED PRICE MINUS DISCOUNT EQUALS SELLING PRICE. MARKED PRICE - DISCOUNT = SELLING PRICE
Interpret the given code to determine the cost price of an item.		Using the formula above solve assigned problems. Using a ten-letter code, read the cost price of an item. For example, 1 PLAY HORNS 1 2345 67890 LYOS = $35.70
Find the rate of markup.	B. Cost price basis	Observe the use of the formula for finding the rate of markup. Calculate the rate of markup in assigned problems.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Determine the price at which an article can be sold to yield a certain rate of markup.		Study the formula for determining the price at which to sell an article. Solve assigned problems.

UNIT XII

MEASUREMENTS FREQUENTLY USED BY THE CONSUMER

General Objectives: *The student will be able to:*

Change denominate numbers from one unit to another.

Find the area and perimeter of plane figures.

VOCABULARY

Area	Perimeter
Denominate number	Square measure
Linear measure	Volume

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Change a denominate number to a higher or lower unit.	I. Denominate numbers	Take a pre-test on simple measure. Observe the illustration of the procedure to change a denominate number to lower or higher units. Solve assigned problems.
Add, subtract, multiply, and divide denominate numbers.		Study the procedure for adding, subtracting, multiplying and dividing denominate numbers.
Find the area, perimeter and volume of certain rectangles and rectangular solids.	II. Rectangles and rectangular solids	Discuss the relationship of rectangles and rectangular solids to business (for example, purchasing or selling carpeting, painting a room, digging a basement, etc.). Discuss the meaning of "perimeter," "area" and "volume." Find the area, perimeter and volume of various items in the classroom.
Apply the formulas to specific business problems.		Solve problems that a businessman might have dealing with area, perimeter, and volume.

UNIT XIII

COMPUTER MATHEMATICS

General Objectives: The student will be able to:

Read and write numbers.

Perform simple mathematical operations in the binary system.

VOCABULARY

Base ten	Hindu-Arabic
Base two	Number
Binary	Numeral
Decimal system	Place value
Digit	System of numeration

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Explain what the decimal system of numeration is.	I. Decimal system of numeration	Supply the numerals in the Hindu-Arabic system. Discuss the decimal system of numeration.
Read and write numbers based on place value.		Write the numerals as the numbers are called. Read the number that is represented by various numerals.
Supply the digits used in the binary system.	II. Binary system of numeration	Discuss the binary system of numeration. Discuss place value in the binary system. Practice reading numbers in the binary system.
Change a number from base two to base ten and from base ten to base two.		Observe demonstration of the procedure for converting from base two to base ten and vice versa. Solve assigned problems.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Perform the basic operations in base two.	III. Binary arithmetic	Observe the demonstration of the basic operations in base two. Solve problems on the basic operations in base two.

UNIT XIV

THE METRIC SYSTEM

General Objectives: *The student will be able to:*

Recognize the need for metrication.

Identify and use accurately the basic units of measurement in the metric system.

VOCABULARY

Centi-
Celsius
Deci-
Deka-
Gram
Hecto-
Height
International System of Units (SI)
Kilo-
Kilogram
Kilolitre
Length
Litre
Long
Mass
Mega-
Metre
Metric system
Milli-
Millilitre
Short
Temperature
Weight
Width

INSTRUCTIONAL OBJECTIVES		CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:			
Discuss the history of the English and metric systems of measurement.	I.	History of measurement	Discuss the historical methods of determining the first standards of measurement.
		A. English system	
		B. Metric system	
Cite instances of common metric usage in the United States today.		C. Current usage	Identify at least three (3) jobs that require the use of the metric system and explain how this measurement system is used.
Explain reasons for passage of the Metric Conversion Act of 1975.	II.	Metric Conversion Act of 1975	Discuss the Metric Conversion Act of 1975 (Public Law 94-168).
		A. Historical background	
		B. Advantages	Identify advantages of converting to the metric system.
			Discuss problems which may be encountered in our change to the metric system. List possible solutions to these problems.
List the four most common units of the metric system that will be exposed to the consumer most frequently.	III.	Most common units	
		A. metre (m) B. litre (ℓ) C. kilogram (kg) D. degree Celsius (°C)	Visit a supermarket and list at least ten products which indicate the quantity or size in metric units.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:	IV. Basic rules in writing metres in accepted SI usage	
Define and discuss the International System of Units (SI).	A. Definition	Define the SI system and discuss the evolvement of the modernized system of measurement established in 1960 by international agreement.
Use appropriate symbols and apply rules of writing metric units.	B. Spelling	Learn to spell metric terms.
	C. Symbols	Have students respond to flash cards including units, prefixes, symbols and values.
Write the most commonly used metric prefixes and state their values.	V. Common prefixes	Discuss the prefixes in the metric system and show their relationship in base ten.
	A. milli-(m)	
	B. centi-(c)	Practice making conversions within the metric system, for example:
	C. deci-(d)	grams to kilograms kilometres to litres millimetres to litres
	D. deka-(da)	
	E. hecto-(h)	
	F. kilo-(k)	Complete the metric system word scramble. See Appendix, page 79.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Identify units of length, using proper terms and symbols.	VI. The metre (length)	Define and discuss the metre as a measure of length.
	A. Definition	
	B. Symbol	Learn the symbols for metre (m), centimetre (cm), millimetre (mm), and kilometre (km).
	C. Units	Have students find distances in kilometres between designated cities on the "Cross Country" map. See Appendix, page 81.
Select, use and read the appropriate linear measuring instrument (metre stick, metric tape measure or centimetre ruler).	D. Concept of metric length	Have each student pick up a metre stick. Stand the stick up on the floor, holding it in place with a hand. Walk around the stick. Stand close to it and with the other hand touch the part of the body which matches the top of the metre stick.
	1. Metre	
	a. Height	
	b. Width	Have each student hold an arm outstretched and extend the metre stick along the length of the arm at shoulder height. Determine at what part of the torso the metre stick ends.

118-A

118-B

INSTRUCTIONAL OBJECTIVES The student will be able to:	CONTENT	SUGGESTED LEARNING ACTIVITIES
	c. Length	Have students take their metre sticks and measure objects around the room. Ask the students if the length of the object is the same as, longer than, or shorter than a metre. Measure such things as the height, the length of a table, the length of a wall, and so on. Have students guesstimate in metres the height of a door, the width of a table, and the height of a chair. Give rough estimates in metres.
	2. Centimetre	Compare the centimetre ruler with the metre stick and show the centimetre divisions on both the stick and the ruler. Have students hold centimetre rulers against the width of their index fingernails noting that this is approximately 1 centimetre. Have students hold rulers against their thumbs from the first joint to the end of the thumb; this length should be about 3 centimetres. The length of the palm of an average hand is about 10 centimetres.

118-C-

118-D

INSTRUCTIONAL OBJECTIVES The student will be able to:	CONTENT	SUGGESTED LEARNING ACTIVITIES
		Spread the following objects on a table: a pencil, a chalkboard, eraser, a coffee pot, and a book. First, have students guess the sizes of the objects in centimetres. Then confirm the sizes with centimetre rulers. Students should write the correct symbol after each guesstimate and after each actual measurement. Have each student make a metre stick by using prepackaged or improvised materials. Divide the length of the stick into 10 equal parts. Label these 1 through 10. These divisions are called <u>decimetres</u> but avoid using the term decimetre with the students. Each decimetre is then divided into 10 equal parts. These divisions are called <u>centimetres</u>. Introduce the metric tape measure. Each student can measure his or her body including chest, waist and hip measurements. Have students record and write the correct symbol after each measurement.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Home Practice: Have students guesstimate and then measure their own or a neighbor's refrigerator, sofa, car and windows. Students should write the correct symbol after each guesstimate and actual measurement.
Convert smaller units to larger units, and larger units to smaller units.	E. Application	Solve assigned problems using metric units.
Recognize and use the appropriate measurement units and symbols for gram and kilogram.	VII. Gram (mass/weight) A. Definition	Define and discuss the gram and kilogram as measures of mass and weight. Differentiate between mass and weight.
	B. Symbols	Learn the symbols for kilogram (kg) and gram (g).
	C. Units	
Select a gram scale as the appropriate measuring instrument when asked to weigh light objects.	D. Concept of metric weight	Observe demonstration of the correct use of scales and balances.
	1. Gram	Practice reading a kilogram scale and a gram scale correctly.

INSTRUCTIONAL OBJECTIVES The student will be able to:	CONTENT	SUGGESTED LEARNING ACTIVITIES
		Have students develop a feeling for the weight/mass of 1 gram, 3 grams, 5 grams, and 20 grams by holding in their hands measures representing these masses. Have students pair up. One member of the pair should close his/her eyes while the other puts one of the gram weights in the other's hands. The person with eyes closed should try to guess the weight/mass of the object. After several turns the partners reverse roles. Assign a group of students to set up a resource table. Spread the following objects on the table: paper clip, nickel, sugar cube, pencil, eraser, sun glasses, and centimetre ruler. Have the class guesstimate the weight of each object in grams. After everyone has recorded his/her guesstimates, then students should find the actual weight of each object using the gram scale, and writing the correct symbol after each guesstimate and measurement.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		Practice measuring the weight of object in grams to within 10% of their actual weight. Record measurement using the symbol g.
Select a kilogram scale as the appropriate measuring instrument when asked to weigh heavy objects.	2. Kilogram	Practice measuring the weight of heavy objects in kilograms to within 10% of their actual weight. Record measurement using the symbol kg. Demonstrate the use of a metric bathroom scale and have students weigh themselves. Have students develop a feeling for the weight of 50 grams, 100 grams, 500 grams, and 1 kilogram by holding in their hands objects representing the masses. Assign a group of students to set up a resource table of heavier objects. Include a brick, an apple, a package of rice, and a large package wrapped for mailing (weighing over 3 kilograms). First have the students to guesstimate the weight of each object in grams or kilograms. After everyone has recorded his/her guesstimates, have

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		students find the actual weight of each object using the scales. Write the correct symbol after each guesstimate and measurement using the correct symbols.
		Have students to examine boxes, cans, and sacks of prepackaged food to see what each one weighs. They can either go to a grocery store or their cupboard. Suggest such things as soup, sugar, flour, dried beans, etc.
Convert smaller units to larger units and larger units to smaller units.	E. Application	Solve assigned problems using metric units.
	VIII. Litre (volume/capacity)	
Recognize and use appropriate measurement units and symbols for litre, and millilitre.	A. Definition	Define and discuss the litre and millilitre as a measurement for capacity.
	B. Symbols	Learn the symbols for litre (ℓ) and millilitre (mℓ).
	C. Units	

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
	D. Concept of capacity	
Select a litre cup as the appropriate measuring instrument when asked to find the capacity or large containers of amounts.	1. Litre	Practice reading measurements on a litre cup correctly. Let students handle containers that will hold a litre. Fill them with rice, sand, flour, sugar, water. etc. Pour the contents into the litre measuring cup to verify that this is indeed a litre. If possible, bring several products that come in litre containers: colas, uncolas, milk, paint, motor oil, etc., and verify that these are in litre containers. Have students lift containers and indicate how many kilograms they are holding. Have students guesstimate the number of litres each of the following containers will hold: paper or plastic coffee cup, juice glass, soft drink container (can or bottle), casserole dish, frying pan, sauce pan. After students have recorded guesstimates, have them actually measure the amount each container will hold.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
		Have students fill a large pail or bucket with as many litres of water as it will hold. Mark with a waterproof marking crayon where each litre comes on the pail so that by the time the pail is full you have a large litre measure. (Food coloring added to the first couple of litres will reduce difficulty in seeing water line.)
		Solve assigned problems using metric units.
Select a set of millilitre spoons as the appropriate instruments when asked to find the capacity of small amounts.	2. Millilitre	Practice reading the measurements on millilitre spoons correctly.
		Measure the correct amount in litres or millilitres needed for a recipe.
		Use common can sizes of fruits and vegetables to find how many millilitres each can contains. Label the size of each can.
Convert smaller units to larger units and larger units to smaller units.	E. Application	Solve assigned problems using metric units.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		
Recognize and use the appropriate measurement unit and symbol for degree Celsius.	IX. Degree Celsius (temperature)	
	A. Definition	Define and discuss the term degree Celsius.
	B. Symbol	Learn the symbol for degree Celsius *(°C)*.
	C. Units	
Select, use and read the appropriate measuring instrument (clinical or nonclinical Celsius thermometer).	D. Concept of temperature	
	1. Degrees	Use a Celsius demonstration thermometer to show students how to read degrees Celsius. Start with *0°* Celsius and point out that water freezes at this temperature. Show *100°C* and indicate that water boils at this temerature. Next demonstrate room temperature (about *21°C*), and normal body temperature (*37°C*). Move the indicator to different numbers and ask students to report readings until they can do it easily.
	2. Hot or cold	Demonstrate different readings and ask students if the reading is hot or cold. For example, *10°C, 30°C, 40°C, -20°C, -5°C*.

INSTRUCTIONAL OBJECTIVES	CONTENT	SUGGESTED LEARNING ACTIVITIES
The student will be able to:		Invite the school nurse to visit the classroom and demonstrate different readings for body temperature. Ask the students to evaluate the readings and tell what they would do about them. Use *37°, 38°C, 39°C, 40°C,* etc., and ask whether these are normal or above normal temperatures for infants, older children, or adults. Assign a student committee to set up a resource table with four or five thermometers and five or six containers of water ranging from very hot (boiling, if possible) to very cold (use ice cubes or snow, if you can). Have class take readings and write down their answers and make sure they are writing the responses correctly. Give students enough experiences so that they become familiar with writing answers. If possible have the students measure and record the temperature outdoors in the sun and in the shade. They might also want to compare the temperature in the sun right next to the building or under a tree. If it is early afternoon, check

INSTRUCTIONAL OBJECTIVES The student will be able to:	CONTENT	SUGGESTED LEARNING ACTIVITIES
		the shade on the east side of the building. Compare the readings and explain the differences.
Convert smaller units to larger units and larger units to smaller units.	E. Application	Solve assigned problems using metric units.

APPENDIX

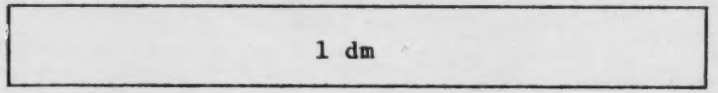
LINEAR MEASUREMENT

Linear measure refers to the length, depth, width, or height of an object.

The base unit of linear measure in the SI, or metric system is the metre. (SI is an abbreviation for Systeme International d'Unites, or International System of Units.) The basic tool for measuring metres is the metre stick. The symbol m is used to denote metre or metres. Notice that no period is placed after the m unless it is at the end of a sentence.

Because a metre is too long to measure many things, it has been divided into smaller units. All of these units have the word metre in them. A different prefix is used to differentiate between these subunits. The three most commonly used subunits all have prefixes that end in the letter i: decimetre, centimetre, millimetre.

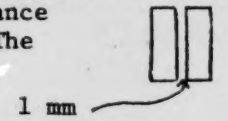
The first subunit is decimetre. It is one tenth of a metre. The rectangle here is one decimetre long. There are 10 decimetres in one metre. The decimetre is a unit that is seldom used; but you should be aware of this unit so that you will have a better understanding of the system. The symbol for decimetre is dm.



If a decimetre is divided into 10 equal subunits, each of these subunits is called centimetre. There are 10 centimetres in a decimetre, or 100 centimetres in a metre. At the right is a rectangle that is one centimetre long. Remember that since there are 100 centimetres in one metre, each centimetre is one hundredth of a metre. Most centimetre rulers are 20 or 30 centimetres long. The symbol cm is used for centimetre.

LINEAR MEASUREMENT (cont'd)

If a centimetre is divided into 10 equal parts, each part is called a millimetre. There are 10 millimetres in a centimetre and 1 000 millimetres in a metre. At the right are two small rectangles. The distance between these rectangles is one millimetre. The symbol mm is used to represent millimetres.



There are times when it is not convenient to refer to large linear measures in metres. When this happens larger units are used. The names of these larger units all have a prefix plus the word "metre." For the larger units the prefixes do not end in the letter i.

The first of these larger units is 10 metres long. It is called dekametre and the symbol dam is used. Ten dekametres is a hectometre (hm). There are 100 metres in one hectometre. Ten hectometres is a kilometre (km). There are 1 000 metres in one kilometre. Kilometres are used to designate distances such as the distance between two cities. Many signs on the interstate highways now give the distance to major cities in kilometres. Speed and velocity are given in kilometres per hour (km/h).

The table below shows the relationship between the base unit (metre) and the other linear units.

Unit	Symbol	Value in Metres	Read as
*kilometre	km	1 000 metres	one thousand metres
hectometre	hm	100 metres	one hundred metres
dekametre	dam	10 metres	ten metres
*metre (base unit)	m	1 metre	one metre
decimetre	dm	0.1 metre	one tenth of a metre
*centimetre	cm	0.01 metre	one hundredth of a metre
*millimetre	mm	0.001 metre	one thousandth of a metre

*Units commonly used.

LINEAR MEASUREMENT (cont'd)

METRIC NOTATION

In writing lengths in metric notation there are a few rules that should be followed. To express a length such as 15 metres you write 15 m. Notice that there is a space between the numeral 15 and the symbol m. Remember that no period is placed after the symbol unless it is at the end of a sentence.

Numbers that are one thousand and larger use a space instead of a comma to separate groups of three digits. Thus, a quantity such as 25,683,927 centimetres should be written 25 683 927 cm.

When referring to quantities less than one unit in length, a zero (0) is placed to the left of the decimal point. Thus, 0.25 cm would be used rather than .25 cm. This is not necessary when there is a combination of whole units and partial units. For example, 2.35 dm is correct; 02.35 is not.

The last rule is that two different units are never mixed. It is not correct to write 6 m and 7 cm. Instead this should be expressed entirely in metres, entirely in centimetres, or entirely in some other linear unit. Since there are 100 cm in 1 m, there are 600 cm in 6 m and hence this length of 6 m and 7 cm could be expressed as 607 cm. If you want to express this in metres rather than in centimetres you must remember that 1 cm is the same as 0.01 m (1 centimetre is the same as one hundredth of a metre). So, 7 cm is 0.07 m and 6 m and 7 cm would be written 6.07 m.

MEASUREMENT OF WEIGHT

The mass of an object refers to a measure of the amount of matter contained in the object. This amount always remains constant so long as something is not added to or subtracted from the object. Weight is the term that most people use when they mean mass. Weight, however, is affected by gravity while mass is not. Thus, the weight of an object on the moon is one sixth its weight on earth. The mass of that same object is the same whether the object is on the moon or on the earth.

The basic SI unit of mass is the kilogram and the symbol kg is used to designate kilogram or kilograms. A kilogram scale will be used to measure kilograms. Kilogram scales come in many shapes and sizes. A bathroom scale and a scale in a doctor's office are two different types of kilogram scales.

A kilogram is a rather heavy unit. Because of this it is often necessary to use subunits for expressing light objects. The most common subunit is the gram. There are one thousand grams in one kilogram. Thus, each gram represents one thousandth of a kilogram. The symbol g is used to represent grams. The units dekagram and hectogram are very seldom used. There are 10 hectograms in one kilogram and 100 dekagrams in one kilogram.

There is one unit larger than a kilogram that is often used. The metric ton is 1 000 kilograms. The metric ton is used for shipping corn, wheat, and other large quantities. The symbol t is used to represent the metric ton. This unit has been spelled tonne but because of possible confusion with the ton (2000 pounds) the term metric ton has been adopted.

MEASUREMENT OF WEIGHT (cont'd)

METRIC NOTATION

In writing weights in metric notation there are a few rules that should be followed. To express a weight such as 37 grams you write 37 g. Notice that there is a space between the numeral 37 and the symbol g. Remember that no period is placed after the symbol unless it is at the end of a sentence.

Numbers that are one thousand or larger use a space instead of a comma to separate groups of three digits. Thus, a quantity such as 45,892 kilograms should be written 45 892 kg.

When referring to quantities less than one unit in weight, a zero (0) is placed to the left of the decimal point. Thus, 0.84 kg would be used rather than .84 kg.

The last rule is that two different units are never mixed. It is not correct to write 45 kg 9 g. Instead this should be expressed entirely in kilograms, entirely in grams, or entirely in some other unit of mass. Since there are 1 000 grams in one kilogram, 45 kg is equal to 45 000 g and so the proper way to express 45 kg 9 g in kilograms is 45 009 g. If you want to express this same quantity in kilograms then you would have to change 9 grams to kilograms. Since one gram is .001 kilograms, 9 g equals 0.009 kg, and thus 45 kg 9 g would be written 45.009 kg.

MEASUREMENT OF CAPACITY

Capacity refers to the amount of space enclosed by an object or container. The term capacity is used to refer to either volume or capacity. The basic unit of capacity in the SI, or metric system, is the litre. A cube or box that is one decimetre long, one decimetre wide, and one decimetre high has a capacity of one cubic decimetre, or one litre. The symbol for a cubic decimetre is dm^3. The symbol for litre is l. Notice that this symbol is not the numeral one but a small, or lower case, letter L. Because there can be some confusion when the last digit of a number is one, it is very important that a space be left between a numeral and the symbol for litre. The litre will be a very common household unit. Milk, motor oil, gasoline, bleach, and soda pop are a few of the products that will be purchased in litres.

The cubic decimetre, or litre, is often too large a unit for many uses. When this happens the smaller unit that is used is the millilitre. There are one thousand millilitres in one litre. The symbol for millilitre is ml. Millilitre is another name for cubic centimetre. A box that is one centimetre long, one centimetre wide, one centimetre high is a cubic centimetre. The symbol for cubic centimetre is cm^3. There are 1 000 cubic centimetres in one cubic decimetre. A teaspoon holds five millilitres.

Since a litre is the basic unit of measure for capacity, smaller or larger units are often needed. When this is the case these new units have names with the word litre plus some prefix. The table below shows the relationship between the base unit (litre) and the other units of capacity.

Unit	Symbol	Value in Litres	Read as
kilolitre	kl	1 000 litres	one thousand litres
hectolitre	hl	100 litres	one hundred litres
dekalitre	dal	10 litres	ten litres
litre*(base unit)	l	1 litre	one litre
decilitre	dl	0.1 litre	one tenth of a litre
centilitre	cl	0.01 litre	one hundredth of a litre
millilitre*	ml	0.001 litre	one thousandth of a litre

*Units commonly used.

MEASUREMENT OF CAPACITY (cont'd)

METRIC NOTATION

In writing quantities of capacity in metric notation there are a few rules that should be followed. A quantity such as 27 litres should be written as 27 l. Note that a space is left between the numeral 27 and the symbol l. This is very important since a lower case el looks like a numeral one. Some early metric guides used a script el, ℓ, but this is discouraged since most typewriters do not have a script el key. When there is a possibility of confusion, the word litre should be written. No period is placed after the symbol unless it is at the end of a sentence.

Numbers that are one thousand or larger use a space instead of a comma to separate groups of three digits. Thus, a quantity such as 27,859 millilitres should be written as 27 859 ml.

When referring to quantities less than one unit in length, a zero (0) is placed to the left of the decimal point. Thus, 0.38 ml would be used rather than .38 ml. This should not be done where there is a combination of whole units and partial units. Write 3.84 kl rather than 03.84 kl.

The last rule is that two different units are never mixed. It is not correct to write or say eight litres four millilitres (8 l 4 ml). Instead this should be expressed entirely in litres, entirely in millilitres, or entirely in some other unit of capacity. Since there are 1 000 ml in one l, there are 8 000 ml in 8 l and so this quantity is 8 004 ml. If this is to be expressed in litres, it is necessary to change 4 ml to 0.004 l for a total of 8.004 l.

MEASUREMENT OF TEMPERATURE

The unit most people will use for measuring temperature is degree Celsius. The tools for measuring temperatures are Celsius thermometers. The symbol for degree Celsius is °C. Usually no space is left between the numeral and the symbol. Thus, 53 degrees Celsius often is written 53°C and not 53 °C. Celsius and C are both capitalized since they are in honor of Anders Celsius, the Swedish astronomer who developed the Celsius scale. The term degree centigrade has been replaced by degree Celsius.

If you place a Celsius thermometer in ice water the reading should be 0°C; if you place it in boiling water the reading should be 100°C. Normal body temperature is 37°C. A comfortable room temperature is 21°C.

Name: _____ Date: _____

WORD SCRAMBLE - THE METRIC SYSTEM

Directions: Match the scrambled words in Column A with the unscrambled words in Column B. Each correct answer is worth five (5) points.

Column A	Column B
1. ghwiet	1. ___ decigram
2. mgkoaril	2. ___ kilometre
3. rlmigllai	3. ___ boiling
4. iacdmreg	4. ___ hectometre
5. dmakgera	5. ___ temperature
6. nhelgt	6. ___ weight
7. cheoeetrmt	7. ___ dekalitre
8. rteme	8. ___ Celsius
9. tnmcierete	9. ___ metric
10. oeltikerm	10. ___ kilogram

Column A	Column B
11. uoelmv	11. ___ length
12. arldtekei	12. ___ decilitre
13. lciitdree	13. ___ dekagram
14. elmilrltii	14. ___ freezing
15. pmerureaett	15. ___ volume
16. tefheahinr	16. ___ milligram
17. scuseli	17. ___ Fahrenheit
18. zgferien	18. ___ metre
19. giblnio	19. ___ millilitre
20. cetirm	20. ___ centimetre

WORD SCRAMBLE - THE METRIC SYSTEM
ANSWER SHEET

1. 4
2. 10
3. 19
4. 7
5. 15
6. 1
7. 12
8. 17
9. 20
10. 2
11. 6
12. 13
13. 5
14. 18
15. 11
16. 3
17. 16
18. 8
19. 14
20. 9

Developed by: C. E. Hall
Vocational Education Curriculum Unit
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CROSS COUNTRY MAP

Here is a map of the United States. The scale on this map is 1 cm = 300 km. That means that if the distance between two cities on the map is 5 cm, then the real distance between those two cities is 5 x 300 km, or 1 500 km. This is the shortest distance between these two cities--the distance an airplane might travel, not the distance a car would travel.

Find the distance in kilometres between each of the following cities. Write your answers on a sheet of paper.

New York and Los Angeles
Boise and St. Louis
New York and Boston
Chicago and Atlanta
Dallas and Boston
Los Angeles and Seattle
Denver and Chicago

KEY TO CROSS COUNTRY MAP

New York and Los Angeles = 4 350 km

Boise and St. Louis = 2 490 km

New York and Boston = 300 km

Chicago and Atlanta = 1 080 km

Dallas and Boston = 2 760 km

Los Angeles and Seattle = 1 740 km

Denver and Chicago = 1 650 km

Accounting

The job family area of Accounting is defined as the science, art, or system of keeping, analyzing and explaining accounts. The jobs listed fall within this definition. There are several jobs that are listed here because they fit the above definition closer than they do any other cluster (e.g., statistician does not exactly fit here, but is more appropriate here than elsewhere).

- Accounting manager
- Cost accountant
- Budget accountant
- Property accountant
- Certified public accountant
- Junior accountant
- Accounting clerk
- Systems accountant
- Bookkeeper
- Tax accountant
- Machine processing accountant
- Statistician
- Mathematician
- Trust clerk
- Accounting representative
- Accounts supervisor

Computer

The job family area may be defined as the electronic method of storing instructions, performing complex computations, or compiling, correlating, and selecting data. The number and kinds of employees needed for these functions vary for different computers. This listing of job occupations is intended to be broad enough to include all computer systems.

- Data methods analyst
- Data typist
- Key-punch operators
- Console operator
- High speed printer operator
- Programmer
- Data reduction technician
- Tape librarian
- Auxiliary equipment operator
- Card-to-tape converter operator
- Sorting machine operator
- Tabulating machine operator
- Teacher-computer

Secretarial Science

This job family area involves the specialization of keeping records, taking dictation, composing, editing, and creative writing. A basic requirement in this area is a knowledge of advanced typewriting. Since there are many different secretarial functions, only the most important are listed.

Stenographer
Legal secretary
Medical secretary
Court reporter
Court clerk

Personnel

The personnel area deals with the functions of recruiting, interviewing, and hiring of people engaged in any work, enterprise, service or establishments. In addition, it involves recording job descriptions and classifications, and personnel discharge, death and/or retirement.

Supervisor
Interviewer

(continued on next page)

Management

The management area is defined as the coordination of those activities that deal with planning, directing, and controlling of personnel. This area has various levels, and the job occupations are listed to include all levels.

Executive
Junior executive
Public relations worker
Supervisor
Instructor, teacher
Educational director
Manager/Owner
Assistant manager
Organizational methods examiner

Finance

This job family area is defined as the science of managing money matters. Only major occupations are listed.

Financial analyst
Financial economist
Bank cashier
Banking reconciliation clerk
Bank president
Bank vice-president

(continued on next page)

Personnel, (cont'd)

Recruiter
Manager
Investigator
Personnel clerk
Personnel records clerk
Personnel relations administrator
Personnel onitor
Job analyst
Position classifier
Personnel counselor
Teacher-personnel
Utilization technician
Administrative officer

Insurance

The insurance area involves the function of insuring against loss. The listed job specialties are only broad occupations to accomplish insurance activities.

Attorney
Insurance clerk
Insurance inspector
Insurance examiner
Insurance safety man
Insurance actuary
Insurance claims adjuster
Insurance salesman
Bordereau clerk
Insurance checker
Teacher/Instructor

Finance, (cont'd)

Bank auditor
Bank teller
Bank loan officer
Accountant analyst
Investment counselor
Credit manager
Teacher/Instructor

Real Estate

This job area family deals with land and what is erected, growing or affixed to the land and transactions involved in these functions.

Real estate broker
Real estate salesman
Real estate appraiser
Real estate escrow clerk
Real estate counselor
Real estate clerk
Real estate location writer
Real estate posting clerk
Real estate expense posting clerk
Teacher/Instructor

Office Clerical

This area may be defined as those office and clerical duties not requiring knowledge of systems of procedures.

General office clerk
Clerk-typist
File clerk
Tax clerk
Mail clerk
Router
Shipping clerk
Order clerk
Business machine operator
Transcriber-machine operator
Receptionist
Messenger
Timekeeper
Typist
Cashier

Books and Booklets

Bitter, Gary G., Jerald L. Mikesell and Kathryn Maurdeff. Activities Handbook for Teaching the Metric System. Allyn and Bacon, Inc., 1976.

Department of the Treasury, Internal Revenue Service. Your Federal Income Tax. (Can be obtained each year from IRS.)

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U.S. Department of Commerce. Measurement Systems. Washington: U.S. Government Printing Office, 1972. Special Publication No. 304A.

U.S. Department of Commerce. What About Metric? Washington: U.S. Government Printing Office, 1973. No. 0-523-717.

Films

The following films are available from the Film Library, Educational Media Center, D.C. Public Schools.

Call Number	Title
128	Decimals are Easy.
1303	Arithmetic - Estimating and Checking Answers.

349	Meaning of Percentage.
2369	Learning About Metric Measures.
290	Language of Graphs.
400	Origin of Mathematics.
2234	Bookkeeping - Occupations and Opportunities.

Filmstrips

The following filmstrips can be obtained from Society for Visual Education, Inc., 1345 Diversey Parkway, Chicago, Illinois 60614.

Understanding Fractions - A530, 1 - 8

- Origin and Meaning of Fractions
- Uses of Fractions
- Language of Fractions
- Different Names for Same Fractional Numbers
- Addition of Fractions
- Subtraction of Fractions
- Multiplication of Fractions
- Division of Fractions

Decimals - A538, 1 - 5

- Meaning and Reading of Decimals
- Addition and Subtraction of Decimals
- Multiplication of Decimals
- Division of Decimals
- Decimals and Measurement

Percent and Percentage - A539, 1 - 7

Percent and Percentage - A539, 1 - 7 (Cont'd):

Meaning and Understanding of Percent; Percentage
Buying and Selling (Application of Percent)
Commission - Meaning and Applications
Interest - Borrowing and Investing
Insurance
State and Local Taxes
Federal Taxes

Tapes

The following tapes are by Dr. Lola J. May and can be obtained from Imperial International Learning, Kanhakee, Illinois 60901.

Basic Mathematical Operations and Concepts
Place value, addition facts, subtraction

Multiplication
Multiplication facts, multiples of 10 and 100, compound multiplication

Division
Division facts through 81, uneven division, long division

Primes, Composites and Fractions
Prime and composite numbers, factoring, least common multiples, fractions (all operations)

Decimals
All operations with decimals

Problem Solving
Writing math sentences, problem solving with fractions and decimals